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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/784,629 | 02/15/2001 | David D. Wu | 2000.032100/TT3633 | 2717 |

23720 7590 01/02/2003

WILLIAMS, MORGAN & AMERSON, P.C.
10333 RICHMOND, SUITE 1100
HOUSTON, TX 77042

EXAMINER

CAO, PHAT X

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2814

DATE MAILED: 01/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/784,629

Applicant(s)

WU ET AL.

Examiner

Phat X. Cao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) 21-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7, 11-17, and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Thompson et al (US. 6,020,244).

With respect to claims 1-2, 11-12 and 47, Thompson (Fig. 3) discloses a method comprising: forming a gate dielectric 27 above a surface of the substrate; forming a doped-poly gate structure 20 above the gate dielectric, the doped-poly gate structure 20 having an edge region; forming a source/drain extension (SDE) adjacent the doped-poly gate structure; and forming a dopant-depleted SDE region including implanting the counter-dopant of p type which is different from n type into the substrate under the edge region of the doped-poly gate structure (see a p-type implanted dopant shown by the parallel lines 35 and 36).

Thompson does not disclose a forming of a dopant-depleted-poly region in the edge region of the doped-poly gate structure. However, because of the angled implant of the p-type

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dopant through the edge regions of the doped-poly gate 20, the dopant-depleted-poly region would inherently be formed in this edge region.

With respect to claims 3 and 13, Thompson further discloses the implantation method of the counter-dopant being a rotating implantation in which ions are implanted with four different implants at four different angles as claimed (column 3, lines 18-37).

With respect to claims 4-7 and 14-17, Thompson further discloses the forming of a photo resist mask 33 defining a source/drain extension, and the forming of depleting dielectric spacers 22 and 21 adjacent the doped-poly gate structure (see Fig. 2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 8-10 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al (US. 6,020,244) in view of Son et al (US. 6,103,562).

With respect to claims 8-9 and 18-19, Lee does not disclose the counter-dopant concentration as claimed.

However, Son (Fig. 5F) teaches the forming of a dopant-depleted-poly region 25c in the edge region of the doped-poly gate structure 25a by angled implanting a counter-dopant with a dose of $1E14 - 1E15/cm^2$ into the edge region (column 4, lines 48-55). Accordingly, it would have been obvious to form the dopant-depleted-poly region of Thompson by implanting the counter-dopant with the concentration as claimed because according to Son, such counter-dopant concentration would maintain a threshold voltage constant despite of reduction of a channel width (column 2, lines 6-9).

With respect to claim 10, it would have been obvious to provide a depth of the dopant-depleted-poly region from the edge of the gate structure in the range as claimed because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

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Response to Arguments

5. Applicant argues that Thompson does not suggest a dopant-depleted region in the edge region of the doped poly gate because Thompson teaches implanting the dopant at a relatively high energy to force the dopant beneath the gate and into the central region of the channel.

The Examiner recognizes that Thompson does teach implanting the counted dopant through the edges of the doped poly gate at a relatively high energy to force the dopant beneath the gate and into the central region of the channel. However, this does not mean that the dopant-depleted region must not be formed in the edge region of the gate even though the dopant implanting through the edge of the gate. Therefore, Applicant fails to provide the evidence which indicates that the dopant-depleted region must not be formed in the edge region of the gate even though the dopants are implanted through the edge of the gate as asserted by Applicant.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR


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1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (703) 308-4917. The Examiner can normally be reached on Monday through Thursday. If attempts to reach the Examiner by telephone are unsuccessfully, the Examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. Group 2800 fax number is (703) 308-7722 or (703) 308-7724.

PC
December 27, 2002


PHAT X. CAO
PRIMARY EXAMINER